

Tamilnadu Board Half Yearly Exam Question Paper 2018

Class 11 Physics

COMMON HALF YEARLY EXAMINATION DECEMBER 2018

Time Allowed: 2.30 Hrs.

Standard 11 PHYSICS

Maximum Marks: 70

- Instructions:**
1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
 2. Use Blue or Black ink to write and underline and pencil to draw diagrams.

Part - A

Note: i) Answer all the questions.

15×1=15

ii) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer.

- 1) If the length and time period of an oscillating pendulum have errors of 1% and 3% respectively then the error in measurement of acceleration due to gravity is.
 - a) 4%
 - b) 5%
 - c) 6%
 - d) 7%
- 2) Which of the following physical quantities have same dimensional formula?
 - a) Torque and Workdone
 - b) Energy and Angular momentum
 - c) Force and Torque
 - d) Angular momentum and Linear momentum
- 3) If a particle has negative velocity and negative acceleration, its speed
 - a) increases
 - b) decreases
 - c) remains the same
 - d) is zero
- 4) An object is dropped in an unknown planet from height 50m. It reaches the ground in 2s. The acceleration due to gravity in this unknown planet is
 - a) $g = 20 \text{ ms}^{-2}$
 - b) $g = 25 \text{ ms}^{-2}$
 - c) $g = 15 \text{ ms}^{-2}$
 - d) $g = 30 \text{ ms}^{-2}$
- 5) A force vector applied on a mass is represented as $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ and accelerates with $\sqrt{2} \text{ ms}^{-2}$. What will be the mass of the body?
 - a) 10kg
 - b) 20kg
 - c) $10\sqrt{2} \text{ kg}$
 - d) $2\sqrt{10} \text{ kg}$
- 6) Two masses m_1 and m_2 are experiencing the same force where $m_1 < m_2$. The ratio of their acceleration a_1/a_2 is
 - a) 1
 - b) less than 1
 - c) greater than 1
 - d) all the three cases
- 7) When an object is at rest on the inclined rough surface,
 - a) Static and Kinetic frictions acting on the object is zero
 - b) Static friction is zero but kinetic friction is not zero
 - c) Static friction is not zero and kinetic friction is zero
 - d) Static and kinetic frictions are not zero
- 8) What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?
 - a) $\sqrt{2gR}$
 - b) $\sqrt{3gR}$
 - c) $\sqrt{5gR}$
 - d) $\sqrt{gR}$
- 9) The coefficient of restitution (e) for a material is as follows
 - a) $e=0$
 - b) $e=1$
 - c) $0 < e < 1$
 - d) $0 > e > -1$
- 10) A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force 30N?
 - a) 0.25 rad s^{-2}
 - b) 25 rad s^{-2}
 - c) 5 ms^{-2}
 - d) 25 ms^{-2}
- 11) The magnitude of the Sun's gravitational field as experienced by Earth is
 - a) same over the year
 - b) decreases in the month of January and increases in the month of July
 - c) decreases in the month of July and increases in the month of January
 - d) increases during day time and decreases during night time
- 12) For a given material, the rigidity modulus is $\left(\frac{1}{3}\right)^{\text{rd}}$ of young's modulus. Its Poisson's ratio is
 - a) 0
 - b) 0.25
 - c) 0.3
 - d) 0.5

- 13) A hot cup of coffee is kept on the table. After some time it attains a thermal equilibrium with the surroundings. By considering the air molecules in the room as a thermodynamic system, which of the following is true?
 a) $\Delta U > 0, Q = 0$ b) $\Delta U > 0, W < 0$
 c) $\Delta U > 0, Q > 0$ d) $\Delta U = 0, Q > 0$
- 14) The efficiency of a heat engine working between the freezing point and boiling point of water is
 a) 6.25% b) 20% c) 26.8% d) 12.5%
- 15) The dimension of sphere of influence of molecules is
 a) $1\text{\AA}$ b) $10\text{\AA}$ c) $100\text{\AA}$ d) $0.1\text{\AA}$

Part - B

Note: Answer any six questions. Question No. 20 is compulsory.

6x2=12

- 16) What are the limitations of dimensional analysis?
 17) Compare scalars and vectors.
 18) Give the various types of friction. Suggest a few methods to reduce friction.
 19) Differentiate elastic and inelastic collisions.
 20) Calculate the work done by a force of 30N in lifting a load of 2kg to a height of 10m ($g = 10\text{ms}^{-2}$).
 21) How do you distinguish between stable and unstable equilibrium?
 22) Why is the energy of a satellite or any other planet negative?
 23) State Hooke's law of elasticity.
 24) In an adiabatic process with an equation $PT^{1/\gamma-1}$, the pressure of a gas is found to be proportional to the cube of the temperature. What is the ratio of C_p/C_v of the gas?

Part - C

Note: Answer any six questions. Question No. 29 is compulsory.

6x3=18

- 25) How is the diameter of the Moon measured using parallax method?
 26) Write a short note on vector product between two vectors.
 27) Explain the concept of inertia. Give examples for inertia of motion, inertia of rest and inertia of direction.
 28) Compare conservative and non-conservative forces.
 29) The position vectors of two point masses 10 kg and 5 kg are $(3\hat{i} + 2\hat{j} + 4\hat{k})\text{m}$, and $(3\hat{i} - 6\hat{j} - 5\hat{k})\text{m}$ respectively. Locate the position of center of mass.
 30) State Kepler's three laws.
 31) Distinguish between Streamlined flow and turbulent flow.
 32) Obtain an ideal gas equation from Boyle's and Charles' laws.
 33) A car moving with a speed of 40 km/hr comes to rest at a distance of 2m after applying brakes. If the same car is moving with a speed of 80 km/hr, what is the minimum stopping distance?

Part - D

Note: Answer all the questions.

5x5=25

- 34) a) Explain the principle of homogeneity of dimensions. What are its uses? Give example. (OR)
 b) State Newton's three laws and discuss their significance.
 35) a) Discuss the properties of scalar and vector products. (OR)
 b) Derive the equation of motion for range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.
 36) a) Explain the motion in a vertical circle. (OR)
 b) State and prove parallel axes theorem.
 37) a) What is escape speed? Derive an expression for it. (OR)
 b) State and prove Bernoulli's theorem.
 38) a) Discuss the various modes of heat transfer. (OR)
 b) Derive Mayer's relation for an ideal gas.